CLAIMS

1. A rocker arm assembly comprising:

an outer rocker arm characterized by two rail portions spaced a distance apart from one another and defining an open space therebetween, each of the rail portions having a high-lift cam follower thereon for engagement with a high-lift cam and defining a locking pin hole;

an inner rocker arm movably connected to the outer rocker arm such that at least a portion of the inner rocker arm is in the open space, the inner rocker arm having a low-lift cam follower thereon for engagement with a low-lift cam;

a locking pin housing on the inner rocker arm at least partially within the open space and having a locking pin bore formed therein; and a first locking pin and a second locking pin selectively movable within the bore between an extended position in which the first and the second locking pins extend into the locking pin holes thereby to prevent relative movement between the inner rocker arm and the outer rocker arm, and a retracted position in which the first and second locking pins do not extend into the locking pin holes.

2. The rocker arm assembly of claim 1, wherein the outer rocker arm is movable relative to the inner rocker arm when the first and second locking pins are in the retracted position; wherein the outer rocker arm includes a tie bar portion operatively interconnecting the two rail portions; and wherein the inner rocker arm surface is characterized by a concavity sufficiently positioned with respect to the tie bar portion to provide clearance for the tie bar portion during relative movement between the inner rocker arm and the outer rocker arm.

3. The rocker arm assembly of claim 1, further comprising a pivot shaft about which the inner rocker arm and the outer rocker arm are pivotably movable with respect to one another; wherein the inner rocker arm is characterized by a pivot shaft retention boss that is a unitary part of the inner rocker arm and through which the pivot shaft extends; and wherein each rail portion of the outer rocker arm defines an aperture through which the pivot shaft extends.

4. The rocker arm assembly of claim 1, wherein each of the high-lift cam followers is characterized by a cam follower surface configured for contact with a high-lift cam; and wherein the rocker arm assembly further comprises a torsion spring operatively connected to the inner rocker arm and the outer rocker arm such that the torsion spring biases the outer rocker arm in a direction to maintain contact between the cam follower surfaces and a high-lift cam.

5. The rocker arm assembly of claim 4, wherein the outer rocker arm is characterized by at least one surface generally opposite from the cam follower surfaces; wherein the inner rocker arm includes a surface that contacts the torsion spring and against which the torsion spring exerts a force; wherein the torsion spring extends alongside the inner rocker arm on two sides thereof, winds about the pivot shaft between the inner rocker arm and each of the outer rocker arm rail portions, and extends from the pivot shaft to said at least one surface generally opposite from the high-lift cam contact surfaces.

6. The rocker arm assembly of claim 1, wherein the locking pin housing bore is characterized by a substantially constant diameter.

7. The rocker arm assembly of claim 1, wherein the inner rocker arm defines a pressure supply aperture through which the first and the second locking pins may be in fluid communication with a source of fluid pressure; and wherein the first locking pin and the second locking pin are sufficiently configured and arranged within the locking pin housing such that the pins are in the retracted position when the fluid pressure exerted against the pins is less than a predetermined amount; and wherein the pins are in the extended position when the fluid pressure exerted against the pins is greater than the predetermined amount.

8. The rocker arm assembly of claim 7, further comprising a first spring retainer in a first end of the locking pin bore, a second spring retainer in a second end of the locking pin bore, a first spring between the first spring retainer and the first locking pin; and a second spring between the second spring retainer and the second locking pin; and a travel stop member positioned between the first locking pin and the second locking pin; the first spring biasing the first locking pin against the travel stop member, and the second spring biasing the second locking pin against the travel stop member.

9. The rocker arm assembly of claim 8, wherein the inner rocker arm is characterized by a pivot interface for receiving a portion of a lash adjustor on which the inner rocker arm is pivotable; wherein the pressure supply aperture is sufficiently located with respect to the pivot interface to provide fluid communication between the lash adjustor and the two locking pins; wherein the locking pin housing defines an aperture in which the travel stop member is retained; and wherein the aperture in which the travel stop member is retained and the pressure supply aperture are characterized by a common axis.

10. The rocker arm assembly of claim 9, wherein the aperture in which the travel stop member is retained and the pressure supply aperture are formed in a single drilling operation.

11. The rocker arm assembly of claim 1, wherein the locking pin bore is formed in a single drilling operation.

12. The rocker arm assembly of claim 1, wherein each of the high-lift cam followers is characterized by a cam follower surface configured for contact with a high-lift cam; and wherein no part of the outer rocker arm extends across any line tangential to the cam follower surfaces.

13. A valvetrain comprising:

a camshaft having a low-lift cam and two high-lift cams, the two high-lift cams being on opposite sides of the low-lift cam;

an outer rocker arm characterized by two rail portions spaced a distance apart from one another and defining an open space therebetween, each of the rail portions having a high-lift cam follower thereon in contact with one of the two high-lift cams and defining a locking pin hole;

an inner rocker arm movably connected to the outer rocker arm such that at least a portion of the inner rocker arm is in the open space, the inner rocker arm having a low-lift cam follower thereon in contact with the low-lift cam;

a locking pin housing on the inner rocker arm at least partially within the open space and having a locking pin bore formed therein; and a first locking pin and a second locking pin selectively movable within the bore between an extended position in which the first and the second locking pins extend into the locking pin holes thereby to prevent relative movement between the inner rocker arm and the outer rocker arm, and a retracted

position in which the first and second locking pins do not extend into the locking pin holes.

14. The valvetrain of claim 13, wherein the outer rocker arm is movable relative to the inner rocker arm when the first and second locking pins are in the retracted position; wherein the outer rocker arm includes a tie bar portion operatively interconnecting the two rail portions; and wherein the inner rocker arm surface is characterized by a concavity sufficiently positioned with respect to the tie bar portion to provide clearance for the tie bar portion during relative movement between the inner rocker arm and the outer rocker arm.

15. The valvetrain of claim 13, further comprising a pivot shaft about which the inner rocker arm and the outer rocker arm are pivotably movable with respect to one another; wherein the inner rocker arm is characterized by a pivot shaft retention boss that is a unitary part of the inner rocker arm and through which the pivot shaft extends; and wherein each rail portion of the outer rocker arm defines an aperture through which the pivot shaft extends.

16. The valvetrain of claim 13, wherein each of the high-lift cam followers is characterized by a cam follower surface with which one of the high-lift cams is in contact; and wherein the rocker arm assembly further comprises a torsion spring operatively connected to the inner rocker arm and the outer rocker arm such that the torsion spring biases the outer rocker arm in a direction to maintain contact between the contact surfaces and the high-lift cams.

17. The valvetrain of claim 16, wherein the outer rocker arm is characterized by at least one surface generally opposite from the cam follower surfaces; wherein the inner rocker arm includes a curved protrusion defining a concave surface; wherein the torsion spring contacts and exerts a force against the concave surface; wherein the torsion spring extends alongside the inner rocker arm on two sides thereof, winds about the pivot shaft between the inner rocker arm and each of the outer rocker arm rail portions, and extends from the pivot shaft to said at least one surface generally opposite from the high-lift cam contact surfaces.

18. The valvetrain of claim 13, further comprising a hydraulic lash adjustor operatively connected to the inner rocker arm such that the inner rocker arm is pivotable about the lash adjustor; wherein the inner rocker arm defines an aperture through which the lash adjustor is in fluid communication with the first locking pin and the second locking pin, wherein the lash adjustor is configured to exert a selectively variable fluid pressure on the first and second locking pins; and wherein the first and second locking pins are in the retracted position when the fluid pressure is below a predetermined amount and in the extended position when the fluid pressure exceeds the predetermined amount.

19. The valvetrain of claim 18, further comprising a first annular spring retainer in a first end of the locking pin bore; a second annular spring retainer in a second end of the locking pin bore; a first spring between the first spring retainer and the first locking pin; and a second spring between the second spring retainer and the second locking pin; and a travel stop member positioned between the first locking pin and the second locking pin; the first spring biasing the first locking pin against the travel stop member, and the second spring biasing the second locking pin against the travel stop member.

20. A rocker arm assembly comprising:

an outer rocker arm, the outer rocker arm characterized by two rail portions spaced a distance apart from one another and defining an open space therebetween, each of the rail portions having a high-lift cam follower thereon and defining a locking pin hole;

an inner rocker arm pivotably connected to the outer rocker arm such that at least a portion of the inner rocker arm is in the open space, the inner rocker arm having a low-lift cam follower thereon;

a locking pin housing on the inner rocker arm at least partially within the open space and having a locking pin bore formed therein; a first locking pin and a second locking pin selectively movable within the bore;

a first annular spring retainer in a first end of the locking pin bore, a second annular spring retainer in a second end of the locking pin bore, a first spring between the first spring retainer and the first locking pin; a second spring between the second spring retainer and the second locking pin; and a travel stop member positioned between the first locking pin and the second locking pin; the first spring biasing the first locking pin against the travel stop member, and the second spring biasing the second locking pin against the travel stop member;

wherein the first and second locking pins are selectively movable between an extended position in which the first and the second locking pins extend through the first and second annular spring retainers and into the locking pin holes thereby to prevent relative movement between the inner rocker arm and the outer rocker arm, and a retracted position in which the first and second locking pins do not extend into the locking pin holes.